Part Number :   FK-FA1410

Product Name :   12-LED AND 3-BOTTON SHIELD

This is the experimental board for receiving and transmitting data from the port of microcontroller. The function of FK-FA1401 is fundamental programming before turning to the higher level. This circuit is adaptable to the other form of circuit such as Light ON/OFF circuit, Priority Testing Game circuit, LED Flasher circuit, LED Running Light circuit.

Specification

1.Power Supply direct from Microcontroller Board.

2.The circuit can be used with Microcontroller Board such as Arduino UNO R3.

3.12-LED size 3 mm. and 3-Tact Switch.

4.PCB dimension : 3.15"x1.14"

Circuit Function

When the circuit supplies 5 VDC to one of those P2 to P13, the LED of that port will light up. There are jumpers at P2 to P4 as an LED port or Switch port.

Figure 1. Circuit Diagram of FK1410
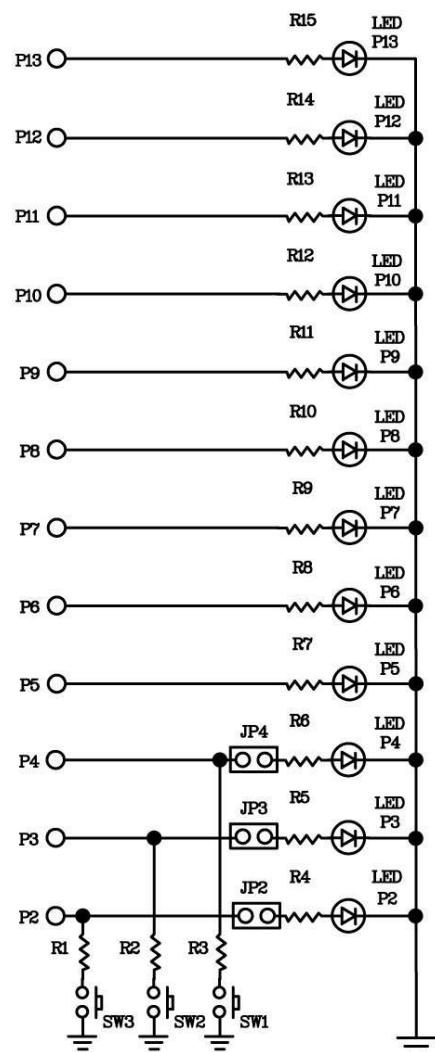
Circuit Assembling

According to Figure 2, the easy assembling should be started with putting the smallest part on the circuit which is resistor. Caution, all parts must be on the right electrodes such as LED. Please see Figure 3 for putting parts on electrodes. As for soldering, use a soldering iron max. 40 watts and tin/lead at 60/40 with flux. After assembling and soldering, re-check the positions of each part. In case some parts are on the wrong positions, use solder suction or solder wick to correct the positioning of those parts.
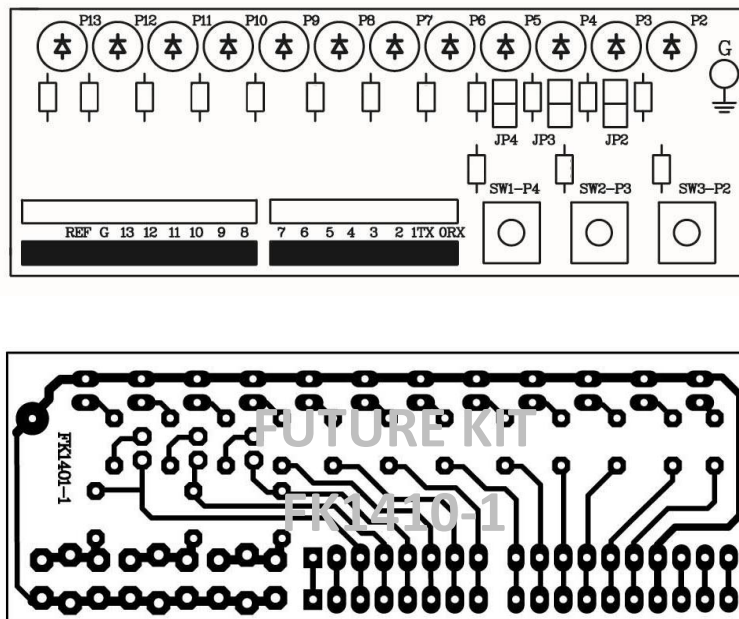
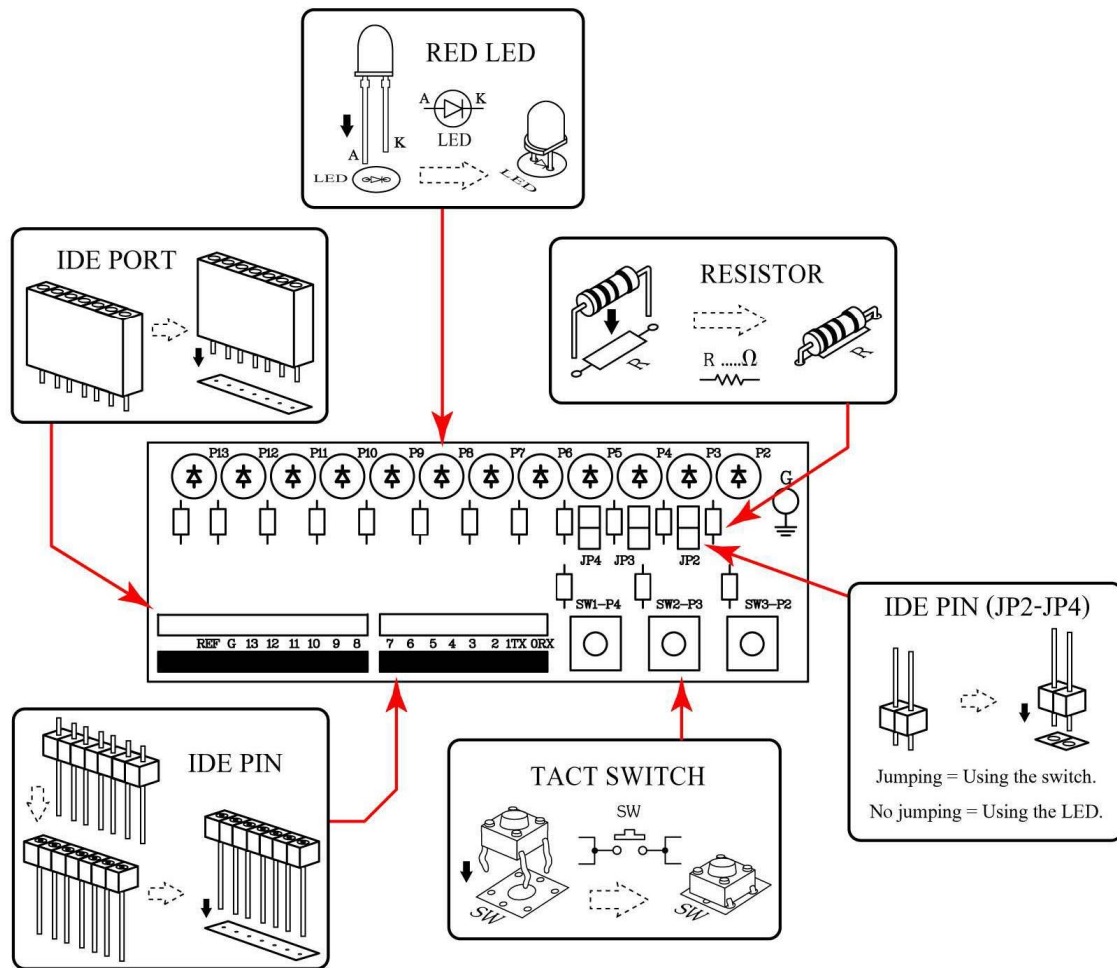Figure 2. The positions for assembling and PCB copper line.

Figure 3. Positioning the parts on PCB

Programming instrument for the experimental board

1.FK-FA1410 12-LED AND 3-BOTTON SHIELD	1	set
2.Microcontroller Board ex. Arduino UNO R3	1	set
3.USB Cable	1	Piece
4.Computer Set	1	Set
5.Arduino Software	1	Piece

Testing Arduino UNO R3 Board

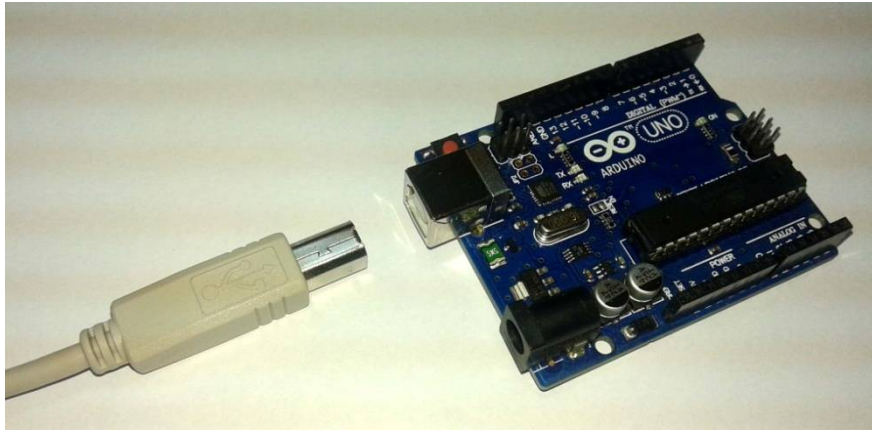1.Connect USB cable with USB port of computer and USB port of Arduino UNO R3 Board.

Figure 4. Connecting USB cable with USB port of Arduino Board

2.Open Arduino program by double-click on Arduino icon. Go to the menu bar and click on File and choose Open. Afterwards, go to the folder "EX" and open the folder "TEST". Then click on the file "Test".
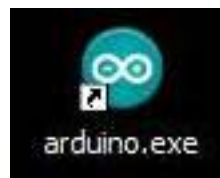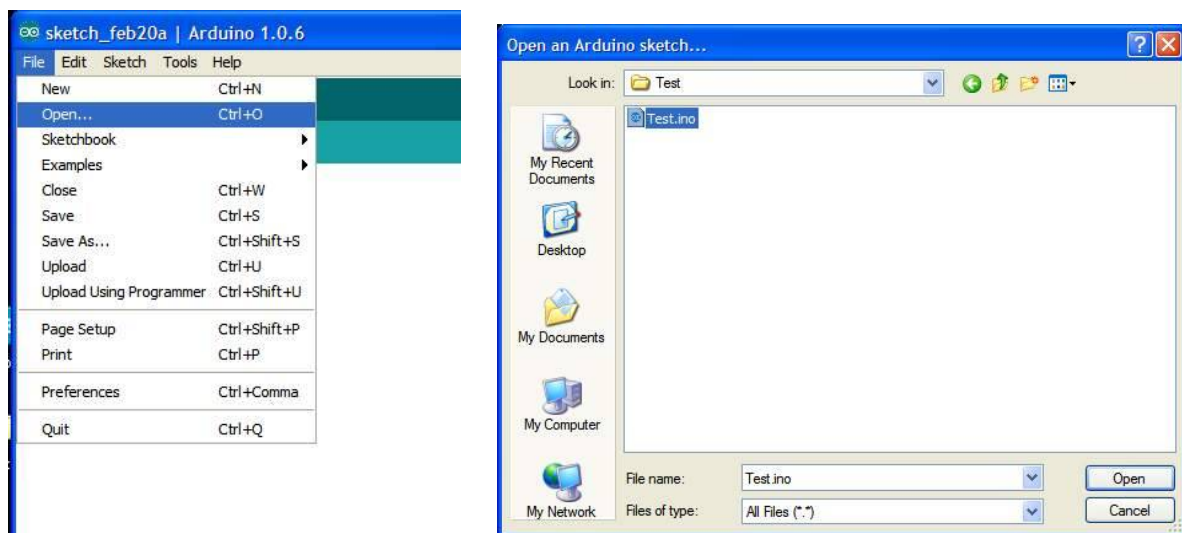

Figure 5. Opening Arduino program

Figure 6. TEST Program

3.Download TEST program to Arduino Board.

Figure 7. Downloading TEST program

4.After downloading, the LED L on Arduino Board will blink which means Arduino board is working.

Figure 8. The position of LED L on Arduino Board circuit

The details of TEST program, Flashing Light Program, Arduino UNO R3 experiment.

void setup() {

  pinMode(13, OUTPUT);   // Set the pin 13 is OUTPUT pin.

}

void loop() {

  digitalWrite(13, HIGH);   // LED at the pin 13 is light-on.

  delay(1000);   // delay time 1 second

  digitalWrite(13, LOW);   // LED at the pin 13 is light-off.

  delay(1000);   // delay time 1 second

  }

The method to connect the circuit with Arduino UNO R3 board

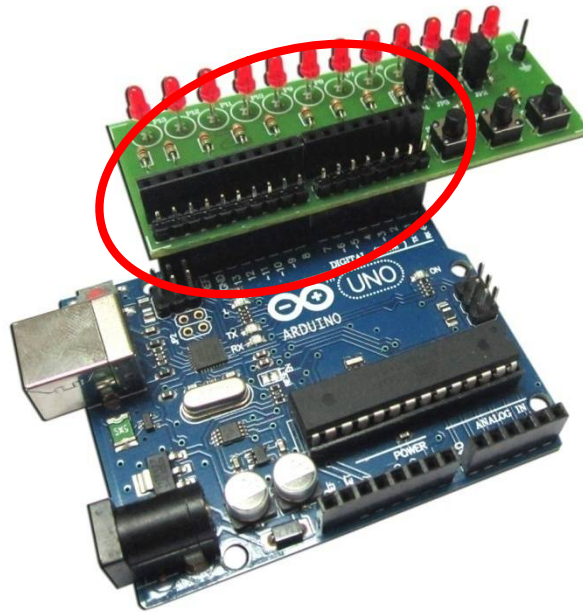Connect FK1410 board with Arduino UNO R3 board at pin P0 to P13. Jump at JP2 to JP4.

Figure 9. Connecting FK1410 board with Arduino UNO R3 board

Programming

1.Connect Arduino UNO R3 board with experimental board by following the instruction of the method to connect the circuit with Arduino UNO R3 board.

2.Connect the USB cable with USB port of computer and USB port of Arduino UNO R3 board.

Figure 10. Wiring the USB cable

3.Double-click on Arduino icon to open Arduino program. Go to "File" in menu bar and choose "Open". Then click on folder "Ex", choose folder "FK1410", choose folder "LAB1410-1" and click on file "LAB1410-1".
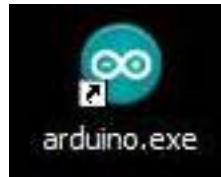

Figure 11. Opening Arduino Program
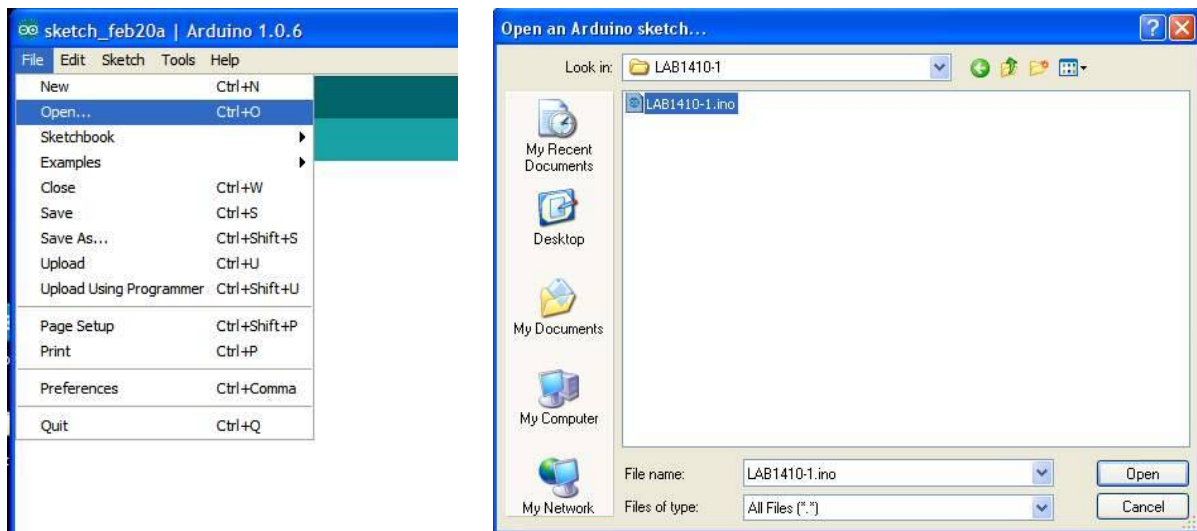

Figure 12. LAB1410-1 program

4.Download LAB1410-1 program to Arduino board.

Figure 13. Downloading LAB1410-1 program

5.After completing downloading, the LED at FK1410 board will be running light-on. The LED circuit section is good working.

6.Remove JP2 to JP4 from FK1410 board.

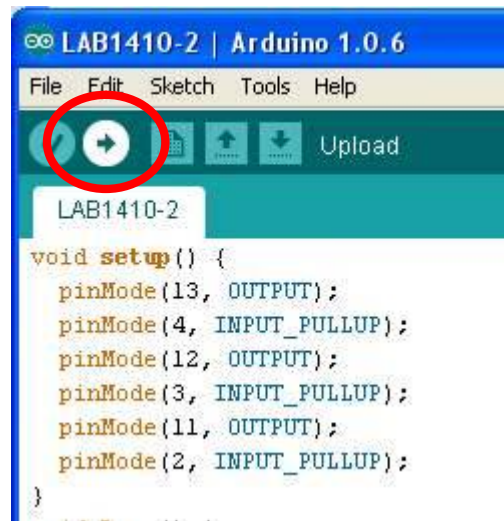7.Open LAB1410-2 in folder "FK1410" and download this program to Arduino UNO R3 board.

Figure 14. Downloading LAB1410-2 program

8.Press and hold switch S1, LED P13 will light-on, release switch S1, LED P13 will light-off.

9.Press and hold switch S2, LED P12 will light-on, release switch S2, LED P12 will light-off.

10.Press and hold switch S3, LED P11 will light-on, release switch S3, LED P11 will light-off.

11.If the test in step 8 to step 10 works, it means the circuit can work.

The details of LAB1410-1 13-LED RUNNING LIGHT program

void setup() {

  pinMode(13, OUTPUT);   // Set the pin 13 is OUTPUT pin.

  pinMode(12, OUTPUT);   // Set the pin 12 is OUTPUT pin.

  pinMode(11, OUTPUT);   // Set the pin 11 is OUTPUT pin.

  pinMode(10, OUTPUT);   // Set the pin 10 is OUTPUT pin.

  pinMode(9, OUTPUT);   // Set the pin 9 is OUTPUT pin.

  pinMode(8, OUTPUT);   // Set the pin 8 is OUTPUT pin.

  pinMode(7, OUTPUT);   // Set the pin 7 is OUTPUT pin.

  pinMode(6, OUTPUT);   // Set the pin 6 is OUTPUT pin.

```
    pinMode(5, OUTPUT);         // Set the pin 5 is OUTPUT pin.

    pinMode(4, OUTPUT);         // Set the pin 4 is OUTPUT pin.

    pinMode(3, OUTPUT);         // Set the pin 3 is OUTPUT pin.

    pinMode(2, OUTPUT);         // Set the pin 2 is OUTPUT pin.

  }

  void loop() {

    digitalWrite(13, HIGH);      // LED at the pin 13 is light-on.

    delay(1000);                 // delay time 1 second

    digitalWrite(13, LOW);       // LED at the pin 13 is light-off.

    delay(1000);                 // delay time 1 second

    digitalWrite(12, HIGH);      // LED at the pin 12 is light-on.

    delay(1000);                 // delay time 1 second

    digitalWrite(12, LOW);       // LED at the pin 12 is light-off.

    delay(1000);                 // delay time 1 second

    digitalWrite(11, HIGH);      // LED at the pin 11 is light-on.

    delay(1000);                 // delay time 1 second

    digitalWrite(11, LOW);       // LED at the pin 11 is light-off.

    delay(1000);                 // delay time 1 second

    digitalWrite(10, HIGH);      // LED at the pin 10 is light-on.

    delay(1000);                 // delay time 1 second

    digitalWrite(10, LOW);       // LED at the pin 10 is light-off.

    delay(1000);                 // delay time 1 second

    digitalWrite(9, HIGH);       // LED at the pin 9 is light-on.

    delay(1000);                 // delay time 1 second

    digitalWrite(9, LOW);        // LED at the pin 9 is light-off.

    delay(1000);                 // delay time 1 second
```

```
digitalWrite(8, HIGH);        // LED at the pin 8 is light-on.

delay(1000);                   // delay time 1 second

digitalWrite(8, LOW);         // LED at the pin 8 is light-off.

delay(1000);                  // delay time 1 second

digitalWrite(7, HIGH);        // LED at the pin 7 is light-on.

delay(1000);                   // delay time 1 second

digitalWrite(7, LOW);         // LED at the pin 7 is light-off.

delay(1000);                  // delay time 1 second

digitalWrite(6, HIGH);        // LED at the pin 6 is light-on.

delay(1000);                   // delay time 1 second

digitalWrite(6, LOW);         // LED at the pin 6 is light-off.

delay(1000);                  // delay time 1 second

digitalWrite(5, HIGH);        // LED at the pin 5 is light-on.

delay(1000);                   // delay time 1 second

digitalWrite(5, LOW);         // LED at the pin 5 is light-off.

delay(1000);                  // delay time 1 second

digitalWrite(4, HIGH);        // LED at the pin 4 is light-on.

delay(1000);                   // delay time 1 second

digitalWrite(4, LOW);         // LED at the pin 4 is light-off.

delay(1000);                  // delay time 1 second

digitalWrite(3, HIGH);        // LED at the pin 3 is light-on.

delay(1000);                   // delay time 1 second

digitalWrite(3, LOW);         // LED at the pin 3 is light-off.

delay(1000);                  // delay time 1 second

digitalWrite(2, HIGH);        // LED at the pin 2 is light-on.

delay(1000);                   // delay time 1 second
```

```
digitalWrite(2, LOW);          // LED at the pin 2 is light-off.

delay(1000);                   // delay time 1 second

}
```

Function of LAB1410-1 program

The program will determine pin 2 to pin 13 as OUTPUT pin. It will light up the LED at pin 13 at 1 second and will extinguished at 1 second. Afterwards, LED at pin 12 will work at 1 second and will be extinguished at 1 second. The program will relay until the LED at pin 2. After the LED at pin 2, the program will start repeating the LED pin 13.

Remark: In case we want LED ON/OFF frequency, we can reduce the value in the parentheses by commanding "delay". The unit of the digit is millisecond.

The details of LAB1410-2 SWITCH TEST program

```
void setup() {

    pinMode(13, OUTPUT);            // Set the pin 13 is OUTPUT pin.

    pinMode(4, INPUT_PULLUP);       // Set the pin 4 is INPUT pin and using the PULL UP
function.

    pinMode(12, OUTPUT);            // Set the pin 12 is OUTPUT pin.

    pinMode(3, INPUT_PULLUP);       // Set the pin 3 is INPUT pin and using the PULL UP
function.

    pinMode(11, OUTPUT);            // Set the pin 11 is OUTPUT pin.

    pinMode(2, INPUT_PULLUP);       // Set the pin 2 is INPUT pin and using the PULL UP
function.

}
void loop() {

    int SW3 = digitalRead(4);       // Set "SW3" word is the variable of value at pin 4.

    int SW2 = digitalRead(3);       // Set "SW2" word is the variable of value at pin 3.

    int SW1 = digitalRead(2);       // Set "SW1" word is the variable of value at pin 2.

    if (SW3 == LOW) { digitalWrite(13, HIGH); } else { digitalWrite(13, LOW); }
```

// If press the switch SW3 (LOW status), LED at pin 13 will be light-on. But if no press the switch SW3 (HIGH status), LED at pin 13 will be light-off.

if (SW2 == LOW) { digitalWrite(12, HIGH); } else { digitalWrite(12, LOW); }

// If press the switch SW2 (LOW status), LED at pin 12 will be light-on. But if no press the switch SW2 (HIGH status), LED at pin 12 will be light-off.

if (SW1 == LOW) { digitalWrite(11, HIGH); } else { digitalWrite(11, LOW); }

// If press the switch SW1 (LOW status), LED at pin 11 will be light-on. But if no press the switch SW1 (HIGH status), LED at pin 11 will be light-off.

}

Function of LAB1410-2 program

The program will determine pin 11 to pin 13 as OUTPUT pin and pin 2 to pin 4 as INPUT pin. Besides INPUT pin, pin 2 to pin 4 can be used for activating the function PULL UP as well.

Press and hold switch SW3 at pin 2, LED P11 will light up, release switch SW3, LED P11 will be light-off.

Press and hold switch SW2 at pin 3, LED P12 will light up, release switch SW2, LED P12 will be light-off.

Press and hold switch SW1 at pin 4, LED P13 will light up, release switch SW1, LED P13 will be light-off.